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Precision SHOOTING

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COVER PHOTO

A shooter firing at the 100 yard targets on the Council Cup Rifle Range, Wapwallopen, Pennsylvania, during the 1965 National Bench Rest Rifle Championship period.

At first glance that range appears to be level but if you will get the picture in perspective with the bench top it will be evident that the ground surface rises rather sharply but smoothly from the firing line to the targets. The 200 yard target line may be seen beyond the 100 yard line.

Note the very solid construction of the benches, and they are on a concrete slab floor.

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Total Paid circulation	2091	2191
Free distribution (including samples) by mail, carrier or other means	93	89
Total distribution	2184	2270
Office use, left-over unaccounted, spoiled after printing	116	80
Total	2300	2350

I certify that the statements made by me above are correct and complete.

P. H. Teachout, Editor

A BROAD CHOICE

There is probably no truer indication of the growth of interest and participation in sport shooting as a hobby and recreational activity than a brief survey of the market that serves these people.

Today's sport shooters have available probably the broadest choice of shooting equipment, accessories and related products that they have ever had, and the choice is constantly increasing. That broad choice would not be available unless the number of potential purchasers constituted a favorable and attractive market demand to manufacturers and the distributing dealer network. Today's broad choice of products also indicates trends in sport shooting.

Indicative of the favorable but increasingly competitive market are these observations. The "old line" gun and shooting equipment manufacturers seem to be constantly striving to improve their products, offering new items and additional products and, in many cases, changing their marketing policy to meet present day demands. New companies and old companies entering a new field are entering the sport shooting market, some with new products and some only with competitive products in established lines. Importers are bringing an increasing number of foreign made products into the U. S. market. Older established firearms manufacturers are reviving past policies of offering premium price grades with superior finish and ornamentation. Newer, smaller companies, are specializing in assembly of quality components into premium grade (and cost) firearms. To top it off, master craftsman custom gun-makers, using highest quality custom made components in many cases, will build a customer just about anything he desires for a superior firearm.

The great increase in the practice of handloading and reloading of ammunition of all kinds has been a big factor in the expansion of the shooting sports market. Handloading the amount of ammunition used for hunting only is not financially practical for the individual. People reload their ammunition because they want to do more shooting. For the individual to substantially increase the amount of shooting done, a good portion of the increase must of necessity be at inanimate targets.

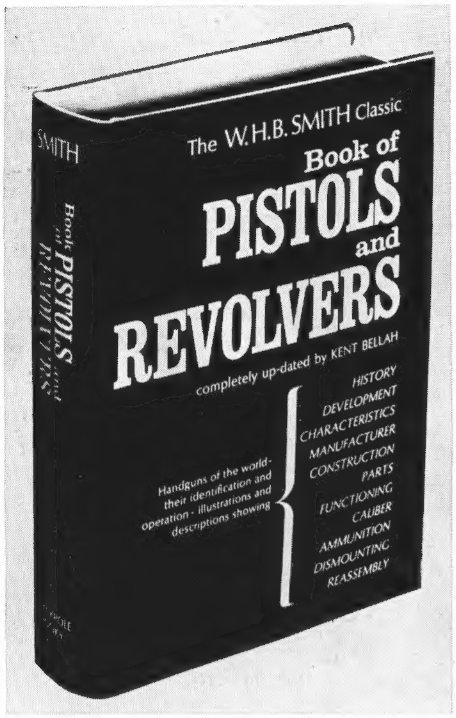
More and more people are engaging in amateur gunsmithing as a hobby and this, of course, increases the demand for gunsmithing tools and equipment in the market place.

It would appear that the number of people engaging in one or another of the shooting sports may be increasing faster than the overall population increase rate. Whether or not that may be true would be a matter for statistical research. At any rate, the numbers of people participating in some recreational or hobby activity are increasing and the shooting sports are probably claiming their share of them.

To the best of this writer's knowledge, the people of no other nation on earth enjoy a greater freedom of participation in shooting sports, or a greater readily available variety of shooting equipment to choose from. Ours is a position to cherish and guard.

Whether as individuals we like it or not, with the fast increasing population growth and concentration into urban areas, more government regulation of the use of firearms is bound to come. If regulation is fair, sensible and adequately enforced it may be a protection for responsible sport shooters as well as the non-shooting public. Acting jointly in cooperative effort the participating shooters have a big potential strength for influencing the adoption of sound, sensible, fair to all responsible people type of regulation. The shooting sports "trade," from manufacturer to local dealer, have a pocketbook incentive for taking an active part toward influencing fair and sensible firearms use regulation. If all parties of the shooting sports join in demonstrating an inclination to cooperate in the adoption of fair firearms use regulation, that is what we may be able to have rather than the harshly restrictive unfair type. But of this you may be sure; there will be regulation of some sort.

PHT



BOOK REVIEW

By Bruce Stewart

The classic new BOOK OF PISTOLS AND REVOLVERS, 6th Edition (1965) has just been published by The Stackpole Co., Harrisburg, Pa., at $13.50. (At your dealer or direct postpaid.) This is the standard reference and identification work in civilian, police and military arms libraries in this country and abroad. It has more information on handguns of the world than any other book or set of books. Part I, by the late W. H. B. Smith, covers weapons before World War II. This part has been carefully revised, corrected, and up-dated by Kent Bellah.

Part II, by Kent Bellah, covers weapons up to this date since World War II. Section Two of Part II covers factory ammunitions, with actual (not factory) pressure and velocity data that varies so much in different makes, and different lots of the same make. Did you know that some cartridges in the same caliber vary 28,000 psi in pressure? Section Three of Part II covers handloading popular handgun cartridges, with actual pressure and velocity data for standard heavy loads, and suggested match loads. This is worthwhile for all handloaders.

Weapons are evaluated, with specification details not available elsewhere. There are details on construction, history, characteristics, operation, functioning, factory changes, development, and serial numbers. The weapons of some 52 makers are listed, more makes than most people heard of, in Part II.

This large book fills the needs of hobby shooters, gunsmiths, arms makers, collectors, the militray, police, handloaders, and anyone interested in firearms. Nearly all weapons are well illustrated with clear photos or drawings to make the text in this encyclopedic work clear. This 6th Edition is greatly enlarged, easily identified by a black dust jacket with white printing. With the companion BOOK OF RIFLES, the price for the set is $16.50 during 1965.

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TOURNAMENT CIRCUIT

BIG "D" SMALLBORE RIFLE TOURNAMENT

Trinity Rifle Club
Dallas, Texas
September 4 and 5, 1965

Many of the old masters found it hard to smile after the Big "D" Smallbore Rifle Tournament which was won by expert classed Owen R. Arnold, Jr., of Houston, Texas with a 3187. Runner-up was Donna Hanson of Irving, Texas with a 3185 who beat her father Richard F. Hanson by three points. Capt. R. L. Nornberg of Lackland AFB was next with a 3177, and Paula Kluge of Austin, Texas won high junior with a 3176.

TOP TEN SCORES FIRED IN THE BIG "D"

Owen R. Arnold, Jr.	3187-202
Donna Hanson	3185-241
Richard Hanson	3182-233
Capt. R. L. Nornberg	3177-198
Paula Kluge	3176-185
Inez Sargent	3175-199
Robert Findley	3175-168
A/1C Harold Gordon	3172-177
Lt. Charles L. Brown	3171-195
Lynn H. Roberson	3171-194

Note that two of the top five are junior girls.

One old master had a good excuse for not being in the top ten, Raymond Sargent did not shoot because of a broken arm which occurred when he slipped and fell in the rain at Camp Perry.

The weather at the Big "D" was not too bad so that the rest of the ninety-four competitors will just have to admit that they had "off" days.

JOHN R. STEPHENS

VERMONT HI-POWER RIFLE MATCH

Thirty-three civilian and military-connected high-power riflemen fired the National Match course at the Northeast Sportsman's Shoot on the National Guard range, West Bolton, Vermont, September 12th. Weather conditions were near ideal; sunny, warm and no more than light breezes.

Sam Burkhalter, Stamford, Conn., won the aggregate with a 249-38V score. A. Couillard was runner-up with 248-35V. Burkhalter shot a 49-4V standing and Couillard a 48-5V. Both went clean in the rapid fire and 600 yard stages, Burkhalter gaining his V-count lead in the rapid fire stages. Both shot a 100-16V score at 600 yards.

James Gomo, Springfield, Vt., was third with 247-25V and Dale Rowe, White River Jct., Vt., fourth and high Expert with 246-27V. Creighton Audette, Springfield, Vt., with 243-25V had a 2V lead over A. Laberge for fifth place ranking.

High Sharpshooter O. Palmer, with aggregate score of 237-16V, fired a 50-4V standing to take top spot in that stage.

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COMING MATCHES

(We will list place, date, type and title of match, name of sponsoring organization, name and address of contact person, at a nominal flat rate of $2.00 per insertion, prepaid with insertion order. Insertion orders must reach the Precision SHOOTING office, Lyndonville, Vt., 05851, at least 45 days before date of match for single insertion orders. For multiple insertions, 30 days additional must be allowed for each additional insertion desired.)

RICHMOND, CALIFORNIA: Richmond Rod and Gun Club presents "The Hunting Rifle Bench Matches" to be held at Richmond Rod and Gun Club, 3155 Goodrick Ave., Richmond, California. The STATE CHAMPIONSHIP on December 12, 1965. Contact Len Sheperd, 229 Clorinda, San Rafael, Calif. 94901—phone 456-5659.

KEENE, NEW HAMPSHIRE

A new NRA Approved high power rifle match was sponsored by the Keene Rifle Club and Cheshire County Fish and Game Club at the new Ferry Brook Range near Keene, N. H., on October 3, 1965. A 400 point aggregate course was fired; 20 shots each at 200 yards S. F. standing, 200 yards sitting rapid fire, 300 yards prone S. F. and 300 yards prone rapid fire. Entry was limited to 48 competitors and 48 shooters from all New England states except Maine fired in the matches.

Grand aggregate winner was Sam Burkhalter, Stamford, Conn. with a 398-28V score (he won the standing stage with a 100-7V score and dropped his two points in the final 300 yard rapid fire stage).

Following Burkhalter in the aggregate were: Robert Johnston, Medford, Mass. 395-15V; Thomas Mansfield, New Boston, N. H. 394-25V; Creighton Audette, Springfield, Vt. 394-20V; Dale Rowe, White River Jct., Vt. (high expert) 393-23V; and George Pratt, Pownal, Vt. 393-22V.

Herbert Clark, Stamford, Conn., won both the 200 yard rapid fire stage (100-9V) and 300 yard slow fire prone stage (100-12V) for a seventh overall aggregate of 392-31V. Creighton Audette won the 300 yard rapid fire stage with a 99-4V. Albert Wood, Farrington, N. H. was second high expert and eighth overall with 388-25V.

THE MOVEMENTS OF A RIFLE BARREL PRIOR TO BULLET EXIT

By Creighton Audette

The September 1965 issue of Precision Shooting contained an article by Ed Shilen titled "Bench Rest Shooting From Sandbag Rests." In this article, Mr. Shilen gave an excellent explanation of several different techniques, used in shooting from sandbag rests, with recommendations on the use of these techniques, and an explanation of the movements of a rifle barrel, prior to bullet exit. It is this last factor which is so extremely important and which necessitates careful "follow-through" in order to shoot small groups and to obtain a consistent point of impact. To most of our readers, Mr. Shilen's article was undoubtedly clear and understandable, however the article contained an editor's note (Paragraph 2, Column 3, Page 9) which was incorrect and at variance with the balance of the article. Reference to this has already been made in the October issue of Precision Shooting.

The present article is an attempt to provide a little more of an explanation of the movements of the rifle barrel, prior to bullet exit. It is not intended to go deeply into this subject in this article nor to become involved in the mathematics of vibration. For those who are interested in reading more about it, the best single article generally available in this country is "The Vibrations of Rifle Barrels" by Captain Philip P. Quayle, Assistant Physicist, United States Bureau of Standards, in the January 1, 1927 issue of the "American Rifleman." Various other references will be found in the article or in the bibliography at the end. It is also of interest that, as in many other facets of rifle shooting, the movements of a rifle barrel prior to bullet exit, including both whip and vibration were known at least as far back as the early 1860's. A little study of available literature will show constant references to it, down through to present day literature, and it is strange that one finds many serious shooters who are not acquainted with this phenomenon, nor aware of its effects on their shooting.

For the purposes of our discussion here, we will divide the movements of the rifle barrel prior to bullet exit into three classifications. These are recoil, whip, and vibration. Probably, from the standpoint of normal rifle shooting, and eliminating Mann rests and some types of machine rests, they are all interrelated and interdependent.

The movement of the barrel due to recoil is simply the reaction to the acceleration of the forward movement of the bullet and powder gases. (You undoubtedly remember from your elementary physics, "Every action has an equal and opposite reaction.") The book "Hatcher's Notebook" contains an excellent explanation of the theory of recoil with both mathematical and experimental data based on the Springfield service rifle using the 150 grain bullet. This gun, weighing 8.69 pounds, in free recoil, moves .06183" before the bullet exits from the muzzle, by mathematical calculation. In order to determine the correctness of these calculations, the gun was suspended on two parallel wires, 12 feet long, so that it was free to swing straight to the rear. An electrical set up was made providing means to produce a spark imprint on a plate with the rifle at rest. The circuit was arranged so that the exit of the bullet from the muzzle produced another spark when the rifle was fired. Measurement of the distance between the two sparks was slightly less than .070".

Using the same formula and calculating for a 10 pound varmint rifle with 26" barrel in .222 caliber with a 50 grain bullet and a 21 grain powder charge, the rifle will have recoiled about .020" when the bullet has reached the muzzle. An 18 pound benchrest rifle with a 28" barrel, of the same caliber and with the same powder and bullet weight will have recoiled about .013" prior to bullet exit.

Whip, is also called jump, and is defined in slightly different terms by various authorities. For the purposes of this article whip will be considered as the movement of the muzzle of a rifle barrel in the vertical plane, during firing, due to the fact that the center of gravity of the rifle and the point of resistance to recoil, at the butt, both lie in a vertical plane below the axis of the barrel. In most rifles the initial movement of the muzzle, due to whip, is in a downward direction. Whip is greatly influenced by the weight, length, and contour of the rifle barrel and some of our present high power rifles of the pump and auto loading types, having light barrels have a whip of anything up to 16 or 18" at 100 yards. This fact is quite evident to anyone who has tried to do a careful job of bore sighting one of them, while mounting a scope.

The first experiments aimed at determining the actual vibrations of a rifle barrel during firing and the relationship of these vibrations to bullet exit and point of impact apparently were made in the 1890's. Experiments were carried on by Crehore and Squire at Dartmouth College, using a .45-70-500 Springfield rifle and were written up in the October 1895 issue of the "Journal of United States Artillery." They used a photographic method. Cranz and Koch in Stuttgart, Germany made similar but more refined experiments in the period 1896-1899. They also employed photographic methods, using a moving strip of film and a light source, which projected the image of a wire attached to the muzzle of the rifle through a slit onto the film. A tuning fork with a wire attached to one of the legs, projected similarly on to the film, enabled the determination of time intervals from the frequency of the vibration. Quayle's experiments have already been mentioned above. He used a combination of electrical and photographic apparatus, using inductance coils mounted about 1" back from the muzzle of the rifle and a vacuum

FIG. 1

FIG. 2

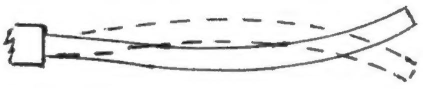


FIG. 3

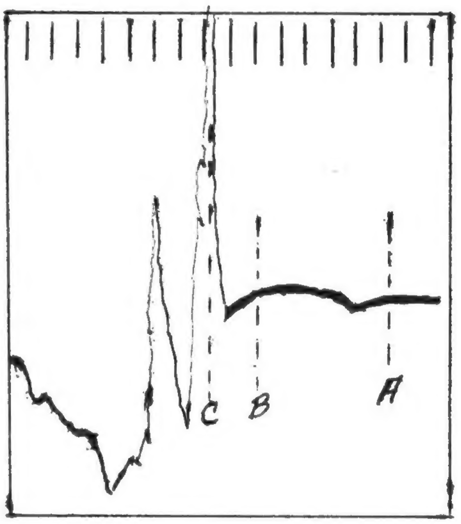
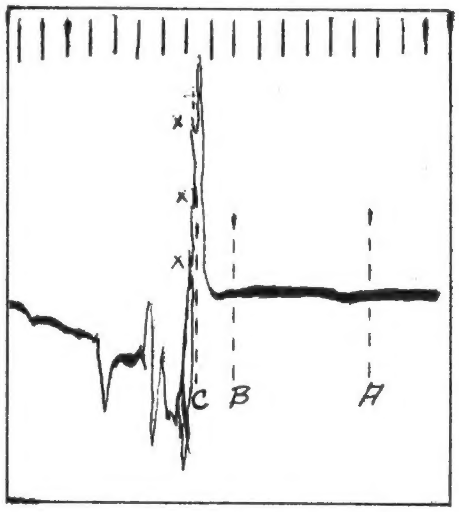


FIG. 4



tube amplifier driving an oscillograph. The output of the oscillograph is recorded on a moving strip of film inside a "camera." There is a second oscillograph attached to an electrically driven tuning fork, whose frequency of vibration is projected on to the film strip as small parallel lines to provide a timing element. Other means are provided to mark the points of the start of the firing pin fall, bullet exit, etc. In general, the correlation between the results obtained from the tests of Cranz and Koch and those of Quayle are very good. British experiments in the early 1900's using the methods of Cranz and Koch to determine the vibrations of the .303 S.M.L.E. rifle also gave good correlation.

The vibrations of a rifle barrel during firing are extremely complex. First of all, they can be divided into vibrations in three different planes. These are longitudinal, torsional, and transverse.

Longitudinal waves in a steel bar or a rifle barrel are merely sound waves which travel back and forth, by reflection from the ends, at a speed of approximately 17,000 feet per second. The motion is like that of the air in an organ pipe. It seems safe to conclude that longitudinal vibrations have no appreciable effect on the flight of the bullet. It should be noted, as will be explained later on, that this speed of sound in steel will result in vibrations set up by the firing pin, primer, initial powder combustion, and process of bullet engraving, reaching the muzzle of the barrel prior to bullet exit. Quayle's experiments, which included tests with a .52 caliber Sharps, Civil War, percussion breech loader, indicate that on rifles of this type having a very heavy hammer and a powerful main spring combined with low velocity and a comparatively long barrel, that appreciable vibrational movement of the muzzle can be produced by these factors prior to bullet exit. His tests on other rifles also indicate that this effect should be very slight on present day high velocity rifles with modern firing mechanisms.

Torsional vibrations may be started by a suddenly applied torque, as when the bullet takes the rifling. The muzzle is an antinode and twists rapidly back and forth through a very small angle. The amplitude is very small and it seems unlikely that there is any measurable effect on the bullet.

Transverse or bending vibrations, in contrast with longitudinal and torsional vibrations may have a considerable effect on the accuracy of shooting. During firing, transverse vibrations may occur in any direction or combination of directions at right angles to the axis of the barrel. In the tests referred to experiments were carried out to determine vibrations in vertical and in horizontal planes. It is interesting to note that the vibrations, in different guns and using different loads, are not necessarily the same in both planes. Many a careful experimenter has noticed that using different loads in the same rifle, under the same conditions, one load may tend to give groups with a consistently greater variation in the vertical plane than horizontal, and another load may show the greater deviation in the horizontal plane. Undoubtedly this is connected with the vibration pattern.

In the case of a rifle barrel, fixed to the receiver at the breech end, and free from there to the muzzle any of the above vibrations occur as primary vibrations and as overtones. Primary vibration is of the type shown in figure 1 where the barrel as a whole vibrates around a single node at the breech. (In a vibrating body nodes are the points of relatively little or no movement; anti-nodes are the points of maximum movement.)

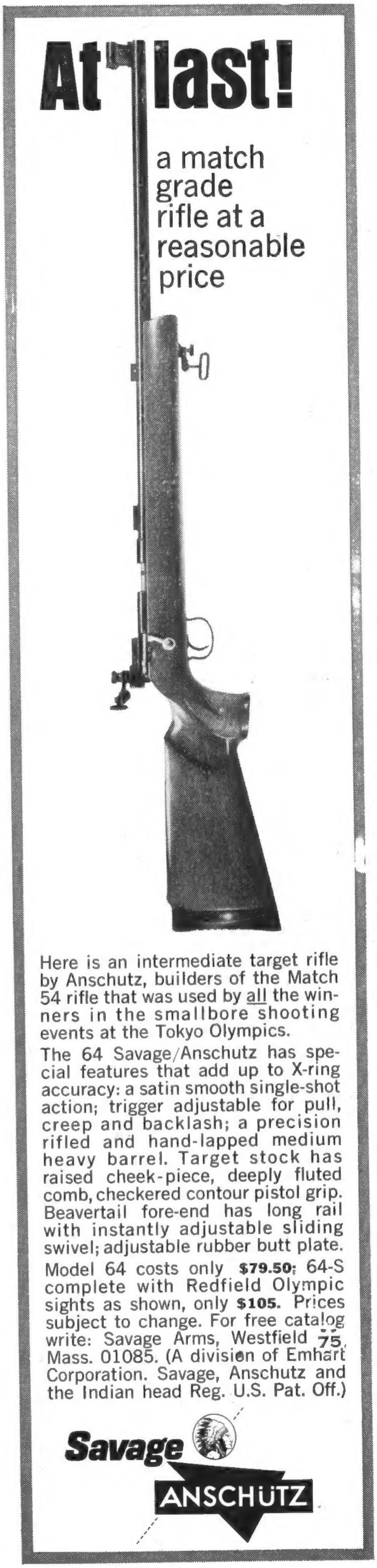
When overtones are present, as they generally are in a rifle barrel during firing, there are additional nodes where the barrel is at rest relative to adjacent points, but partakes of the general swing of the fundamental or primary. Figure 2 is a diagram of a rifle barrel vibrating in its first overtone. It should be remembered that both vibrations are occurring at the same time. For a straight cylindrical barrel, there is a fixed mathematical relationship between the primary vibrations and the overtones. Tapering or curved barrel contours change this relationship. There can be more than one overtone and tests have indicated that the S.M.L.E. with the light barrel has three overtones spaced as follows:

DISTANCE IN INCHES FROM MUZZLE

First Overtone	5.1"		
Second Overtone	2.98"	11.27"	
Third Overtone	2.13"	8.04"	14.55"

An interesting and simple experiment to determine the location of the nodes in a rifle barrel may be done as follows. Remove the barrel and action from the stock. Using soft shims, to prevent marring, clamp the receiver in a heavy vise with the barrel free. Make up a number of small "U" shaped pieces of light wire with the diameter of the curve large enough to go freely over the largest diameter of the barrel, and space them evenly along the barrel. Strike the receiver tang with a mallet, causing the rifle barrel to vibrate. Striking several times will cause the wire riders to gather at the nodes of the overtones. Similar tests to determine the nodes, while actually firing, have been made by cementing a narrow trough of paper to a rifle barrel and filling it with a uniform layer of dry sand. Upon firing, the vibrations at the anti-nodes will disperse the sand layer at these points, and cause a concentration of sand at the nodes. The muzzle end of a free floating barrel is always an anti-node. It seems evident that the first overtone has the greatest influence on accuracy. It can be easily seen that, assuming the same amplitude of vibration for both the primary and the first overtone, the angular displacement for the overtone is considerably greater since the node is only a

Turn page



Here is an intermediate target rifle by Anschutz, builders of the Match 54 rifle that was used by all the winners in the smallbore shooting events at the Tokyo Olympics.

The 64 Savage/Anschutz has special features that add up to X-ring accuracy: a satin smooth single-shot action; trigger adjustable for pull, creep and backlash; a precision rifled and hand-lapped medium heavy barrel. Target stock has raised cheek-piece, deeply fluted comb, checkered contour pistol grip. Beavertail fore-end has long rail with instantly adjustable sliding swivel; adjustable rubber butt plate.

Model 64 costs only **$79.50**; 64-S complete with Redfield Olympic sights as shown, only **$105.** Prices subject to change. For free catalog write: Savage Arms, Westfield 75, Mass. 01085. (A division of Emhart Corporation. Savage, Anschutz and the Indian head Reg. U.S. Pat. Off.)

short distance from the muzzle, while the primary node is located at the receiver.

With the above information as a background, please study figure 3, which is a tracing of one of the film strips from Quayle's experiments. The rifle was a service Springfield mounted in a rest to approximate the holding points and resistance of a rifle fired from the shoulder. The horizontal movement of the curved trace line represents time and may be gaged by each of the small vertical lines at the top. The interval between vertical lines represents 1/1036.8 second. The firing pin started its fall at "A", struck the primer at "B", and the time of bullet exit is indicated by "C." In this particular case, the amplification selected was such to enable a study of the vibration of the barrel resulting from firing pin fall and impact on the primer. This magnification is such that the few thousandths of movement of the muzzle at the time of bullet exit is increased to a double amplitude of 6" or 8" which is too wide for the film strip and thus it is not possible on this film to determine the exact point of bullet exit. This test shows the vibrations in a vertical plane, using the 150 grain service cartridge giving 2700 foot seconds velocity.

Figure 4 is a tracing of a similar test with the amplification reduced to keep the vibration curve on the film strip. In Quayle's write up in the January 1, 1927 issue of the "American Rifleman," there are three similar charts of shots using the same service load. There is a slight variation in them and due to the steep slope of the vibration curves, the identification of the exact point at which the bullet exit occurred is a very difficult matter. From these three curves, Quayle concluded that the exit of the bullet must occur at about the middle of the second quarter of the first overtone velocity curve or perhaps a trifle lower.

It is most important, in studying these curves, to remember that they cannot be taken as direct readings for the following reasons as explained by Quayle.

> "In referring to the records obtained with this apparatus, it must be kept in mind that the oscillograms are in reality records of the transverse velocity of the muzzle. However, the velocity is zero when the displacement is a maximum and greatest when the displacement is zero. Hence the points of maximum and minimum displacement of the oscillograms correspond respectively to points of minimum and maximum displacement of the muzzle. Add to this that an upward or downward motion of the muzzle produced a similar motion in the oscillograph velocity curve and we see that the displacement curve lags the velocity curve by 90 degrees."

This may be a little easier to understand if you will just think for a moment in terms of a simple primary vibration such as the leg of a tuning fork. At the extremes of its swing during vibration, the leg of the fork slows down, harmonically, to zero velocity at the extremes, accelerates to maximum velocity at the time it is passing its normal point of rest, and goes through the same action the other side of the rest point, during each cycle. The velocity change varies the inductance of the coil, in the set up used by Quayle.

Constructing a displacement curve to take the 90 degree lag into account, Quayle concludes that the exit of the bullet occurred at or a little short of the peak of the first upward swing of the muzzle.

Quayle's tests also included a shot fired through an oiled barrel, and shots of the 150 grain bullet loaded to 2008 feet per second, 1201 feet per second and 998 feet per second.

The result of the coating of oil seems to have been to make the exit of the bullet occur a little earlier than in the case of a dry barrel, which in this case would cause the bullet to strike somewhat lower than usual. (It should be understood that this is not necessarily true under conditions other than those of this test.)

The 2008 foot second bullet left the muzzle at the top of the first upward swing. The 1201 foot second bullet left the muzzle near the end of a downward swing as did the 998 foot second bullet.

Similar tests were made in the horizontal plane and the tests included a heavy barrel Springfield match rifle, a heavy barrel Martini free rifle and a .45-70-500 Springfield, as well as the Sharps .52 caliber referred to earlier.

Quayle concludes, "The records just given confirm the conclusions of earlier experimenters that the lower the charge, the more vibrations have developed before the exit of the projectile occurs. The amplitude of these vibrations is, however, correspondingly diminished."

Quayle's tests indicated that the fundamental vibration of the 30 caliber service Springfield barrel is at a frequency of 61 cycles per second. It was difficult to determine the frequency of the first overtone accurately as it was quickly combined with other oscillations. Quayle states that it is approximately 432 cycles per second.

Referring to figure 4, the three small peaks marked with an "X" are the first three overtone cycles produced before the vibration of the first overtone was covered up by other oscillations.

It can be easily understood that any variations in ignition, pressure, velocity, bullet size, bullet seating depth, the random manner in which the bullet enters the throat and barrel condition, including changes in fouling during firing, can easily affect the vibration and the relative time of bullet exit. Add to these the possible conditions of poor alignment and poor contact of the barrel thread and shoulder against the receiver, unequal contact of locking lugs, and changes in the bedding of the receiver in the stock during firing, none of which can be controlled by the shooter while he is shooting a match.

With an understanding of the movements of the rifle barrel prior to bullet exit and the actions of recoil, whip, and barrel vibration, it becomes much easier to understand Ed Shilen's statements on the necessity of shot to shot uniformity of the position of the rifle on the sand bags, grip, muscular tensions, let-off, and "follow through" in all phases.

There are some other interesting aspects to the question of vibration in rifle shooting. Oil or grease in the rifle chamber will not only alter the pressure and velocity, but cause a change in vibration, since the case slips more in the chamber during firing and transmits a different load to the locking lugs. Wet cartridges (shooting in the rain) do the same thing. This is less well known in this country than in the British Commonwealth, because most of our high power target rifles have locking lugs at the head of the bolt, inside the receiver ring, and the effect is minimized with this construction. Riflemen using the Lee-Enfield series know this very well and the following is quoted from Sweet's book, "Competitive Rifle Shooting" under the heading "Effect of Wet Cartridges On Different Rifles."

> "P14 (Same as our 1917 Enfield) Owing to the way the bolt is locked on this rifle, wet cartridges will move the centre of the group no more than a point higher."
>
> "No 4 Rifle—Wet cartridges cause a four point change in the group centre. The extra shock is taken fairly evenly, owing to the strengthened action-body and good groups can still be formed with the rifle."
>
> "S.M.L.E. Wet cartridges cause the centre of the group to form about 5 points higher. The group size cannot be relied upon to the same extent as with the No. 4 rifle, as the extra shock is not distributed so evenly in the action-body, and in extreme cases the action body has been known to fracture on the left hand side."
>
> "S.M.L.E. with B.S.A. heavy barrel—group change will be about 12 points higher."

Of the high power rifles commonly used in this country, the Savage model 99, with its rear-locked bolt behaves most like the British No. 4. A friend has a very accurate model 99, in .250 Savage caliber. When not in use, the barrel is cleaned and coated with "Rig." No matter how well the chamber and bore are wiped out before firing, the first two shots print 3 minutes higher than succeeding shots. If the bore and chamber are cleaned, and left overnight wet with "Hoppe's," wiping of bore and chamber prior to firing will put the first two shots in with the balance of the group.

It is possible for a freshly oiled, or greased bolt to cause changes in the point of impact for the first few shots. Failure to remove all the sizing lubricant, after full length sizing of cases can cause variations in the point of impact.

With the availability of advanced scientific instruments today, it seems odd that no articles have been published on the subject of barrel vibration in recent years. Undoubtedly, some of our commercial arms companies or government armories or arsenals have done further test work since the time of Quayle's experiments, but there seems to be a reluctance to release information on this subject.

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• • •

Random Shots

By Betty Summerall Duncan

Equipment versus know-how—the debate on the relative importance of the two has been going on since ante-backing target days. Back then, range talent included agility as a runner — to retrieve one's clean target before some poor loser added an 8 or worse.

At Perry this year, there was no necessity for a lot of talk. It would have been completely overshadowed anyway by the dynamic actions of a certain extremely likable, unassuming competitor. He proved a number of things to a number of people . . .

In so doing, he lent encouragement to those who are beaten before they even get down into position because of a feeling that their rifles are inferior to some others on the line . . .

Few Masters would even bother to travel to a tournament with an outfit that does not group well under 1-inch. We consider a dime a suitable measure for a 10-shot group from machine rest in our 100-yd. tunnel. Yet . . . the **National Smallbore Prone Championship was won with a rifle which group tests over an inch!!!**

Some of the die-hards are still scratching their heads over the irrefutable evidence that a stack of their precision barrels carefully cleaned after each stage, bedders, light meters, custom stocks, and selected ammo are all subordinate to and/or contingent upon the talents of the "fellow behind the butt."

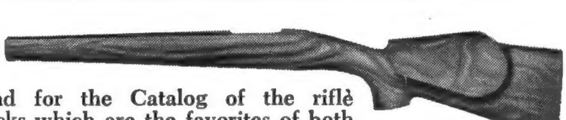
It is when the going is roughest that Master Sergeant WILLIAM E. KRILLING bears down the hardest. His Korean decoration attests to that. Is that not a prerequisite for being a true champion? It was entirely fitting and proper that Bill shot his way to the National Prone Championship on the heels of his absolute mastery of the 3200 Critchfield Aggregate. What made it more of a triumph was the nature of the equipment which he was bucking.

When Krilling and teammates Wigger, Anderson, Pool, Gunnarsson, and Foster returned to Ft. Benning from their victorious European tour (previously described), their shooting equipment was missing. The USA MTU supply of rifles had already been picked over by those trying out for Perry. Little time remained for the "cream of the crop" to either borrow equipment or assemble the dregs.

Bill Krilling, in desperation, had the trigger worked over on the left-over prone Anschutz to which he fell heir and tried a few lots of ammo. Bear in mind that this was a rifle which had been rejected by everyone else. (Apologies to Anschutz—it was merely worn out.) Lt. Hanson came to his rescue and lent Bill a leather shooting jacket. He used a plastic ammo box in lieu of a shooting block, and checked out the rest of his gear from supply, which included one of the unit's older scopes. As someone said, the scope didn't really matter, considering Bill's ability to see bullet holes with the naked eye. Just an exaggerated way of saying that he has wonderful eyesight. But, he needed somthing going for him, don't you agree? . . . It seems that the weather ran the gamut, from WIND to merely wind to rain, then heat and humidity. Typical?

A well done Sgt. Krilling! The National 300-meter Champion, who won the 50-meter 3-position in Switzerland this summer, and now is King of the Hill in smallbore prone shooting, symbolizes the **depth**

Turn page



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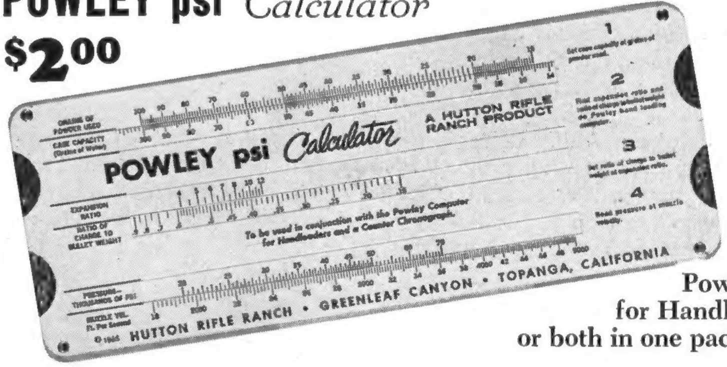
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which the U. S. rifle shooting program has attained during the past very few years through the efforts of a handful of individual shooters.

****

What is in it for them? Only recognition and the satisfaction of accomplishment. It is hoped that their capacity for experiencing satisfaction is such that it compensates for the lack of recognition, which is practically nil.

(To be continued)

• • •

NEW COLT .38 MARK III GOLD CUP

By Kent Bellah

Colt's greatly improved .38 Gold Cup National Match Mid-range pistol is identified by Serial No. 4500 NM or higher, with Mark III stamped on the barrel and Elliason stamped on the improved rear sight.

Colt introduced the world's finest .38 match pistol, the Gold Cup National Match Mid-Range, in December, 1960, starting with Serial No. 103 MR. It had some bad faults, because any highly tuned match pistol is apt to be as temperamental as a race horse. This one was to the nth degree. It shot best with factory ammo using Hollow Base Wadcutters of .355 or smaller, which is equally true of the S & W Model 52. Both weapons would malfunction occasionally with "standard" .358 bullets, or even .357 diameter, and most reloads gave lousy accuracy. Sizing standard castings to .354 wasn't the solution.

The .38 Gold Cup was so cranky that you had to find a particular lot of factory ammo to get 50 yard 10-ring groups of 10 shots, and that wasn't always easy to do. I believe one major fault was in the tight .354 to .355 groove diameter, although the left hand twist was a desirable 1:14. Colt's improved it in January, 1962, starting with Serial No. 4032 MR, using a .357 to .358 groove. This one wasn't so cranky, but it still wasn't perfect, even with Colt's hand fitting.

Colt's had the know-how to make a top .38 match pistol, and they were determined to do so. They succeeded very well indeed when they introduced a greatly improved Mark III Gold Cup, the most accurate .38 I've ever fired right out of the box. Colt's call it, "The finest .38 Target pistol in the world, with no modification necessary for perfect accuracy." It isn't nearly so temperamental, and it functions beautifully with any ammo or reasonable reload. I believe it holds ammunition accuracy closer than any make of pistol. It's a worthy companion to Colt's .45 ACP Gold Cup counterpart, with better accuracy.

The improved Mark III has the superb new Colt-Elliason rear sight, a worthwhile feature, starting with Serial No. 4500 NM. This is the same fine sight used on Colt's .45 Gold Cup counterpart that was improved starting with Serial No. 14,500, also in April, 1965, and on the Colt .22 Woodsman Match Target, improved on about the same date. Mark III "guts" are improved, with vital parts showing evidence of careful hand fitting, certainly custom quality. On the Colt-Elliason rear sight one click "Up" moves the center of impact ⅜" up at 50 yards. One click "R" moves the impact ½" right. The sights hold zero perfectly, a most important feature.

These are not true production weapons, such as are made for the police and military, that are sloppy fitted to insure perfect functioning under all combat conditions. Our GI .45 Army Mule was never made to win matches in competition with the refined Gold Cup model, but it always was, and still remains, the most efficient and dependable military sidearm in the entire world. More men as civilians, the military and police have bet their life on Colt handguns over a longer period of time than on any other make. Colt's record is enviable.

Part of the fine Mark III accuracy is due to the threaded (grooved) chamber and patented barrel bushing. The barrel is held in perfect alignment until bullets leave the bore. The grooved chamber acts as a friction delay to hold the breech closed until bullets leave the bore, a fine feature. Fired shells show very slight imprints of chamber grooves, but they are not damaged in the least for reloading, nor is reloading life reduced. Grooved chambers have been used in other weapons. With high pressure loads, such as the .30 U. S. Carbine in pistols, cases are damaged for reloading, but low pressure Mid-Range loads do not have cases damaged in the Colt Mark III.

Actual accuracy depends on the particular lot of ammo, and on the particular pistol, just as with rifles. The Mark III is certainly a 10-ring gun at 50 yards for 10 shots in the 3.39" ring. No gun is released until it groups in less than 3.25", but many groups go in the 1.695" X-ring or less. It holds the accuracy of the ammo to an extremely high degree. Federal and Remington match ammo in several lots shot 2.0" to 2.5" groups. Federal is making excellent ammo. Their Mid-Range Match averaged 749 fps with 52 fps velocity spread for one lot. Federal's first lot of Mid-Range ammo, not labeled "Match," had plain (solid) base bullets that gave poor accuracy in all guns we tested. It was accurately loaded and in excellent cases, and the only fault was in the bullet design.

Federal promptly switched to Hollow Base Wadcutters that gave superb accuracy. The government bought some 2 million rounds on an accuracy basis, probably some of the most accurate ammo ever made in .38 Mid-Range Match. Some of this was packaged in the old boxes, but all lots are labeled Match today, and deserve the title. The lots are uniformly good, and all lots of cases that we have used are uniform in dimensions, and excellent for reloading. Remington .38 match ammo has long been very high average quality. We have cause to be proud of all U. S. made match fodder, and the Colt Mark III that shoots it so well.

Speer's Hollow Base Wadcutter, introduced in 1964, seems to be the best match bullet for reloads. All factory loads use this general type, designed by Ed McGivern in 1916. McGivern was the greatest practical handgunner of all time. The records he set more than a generation ago in fast and fancy revolver shooting have never been approached. They will probably stand forever, despite the fact that we have more accurate factory ammo and guns today.

McGivern's step son, Freeman K. Teague, Portland, Oregon, tells me Ed's "fast" Colt revolver is owned by C. E. Berkner, Great Falls, Montana. This famous gun is listed on page 163 of Ed McGivern's book, "Fast & Fancy Revolver Shooting," with targets shot in Denver, Colorado in 1919. McGivern also used an old "long action" S & W, that is on display at the World's Fair. Current "short action" S & W revolvers are difficult to shoot double-action. McGivern could not have set such records with these guns that have such a stiff action.

Speer improved the McGivern Hollow Base Wadcutter by making it with a 2-diameter body that shoots equally well in tight or sloppy bores. The large diameter over the hollow base can swage down or expand up to insure a perfect gas seal with a bearing surface that perfectly fills the grooves.

A bevel base eliminates rifling fins that throw bullets out of true flight. It also aids perfect, straight line seating with minimum case mouth bell without shaving lead. This helps the bullet leave the bore undeformed, and in true flight. Speer also sells a plain base wadcutter that I consider inferior to their Hollow Base.

Some chaps say reloads won't equal factory match loads in the .38, but they will. We loaded the Speer H. B. W. ahead of 2.8 grs. Bullseye and CCI 500 primers, in cases trimmed to 1.142. These were deburred heavily inside and very lightly outside, with primers seated 0.004 below case heads on a Star machine. CCI pistol primers are not critical in seating depth so long as they fully bottom in the pocket and are a bit below the case head face. Bullets should be seated flush with the case mouth without crimping.

Some chaps use 2.5 grs. Bullseye. I consider this too light for perfect functioning with metered loads. A charge that is as little as 0.2 grain light may drop a point or fail to function. If a 2.8 gr. charge is slightly short it will still function and probably print in the group. It's quite easy to throw slightly short charges with any measure, or the charge bar in any machine. For small charges of pistol powders I recommend the SAECO measure with a Pistol Drum. We have several of these drums that have been set for 15 years for specific charges and they still throw those charges accurately. They can, of course, be adjusted for a different charge and locked.

Actually, 3.0 grs. Bullseye is an accurate load, almost equal to a target charge. It's fine for varmints or small game to 75 yards or more, which is longer range than most people can consistently make good hits. Wadcutters have much better killing power on small game than indicated by paper ballistics for the low velocity. A .38 is a big caliber for small game and quite effective at Lo-V. Most small animal hunters can use this load to bag more game with fewer shots than with heavier loads.

In the Mark III the 3.0 gr. Bullseye load averages 864 fps with velocity spread only 28 fps, well within specifications for top grade match ammo. The Mark III Gold Cup bore runs .347 to .348, groove .357 to .358, with a 1:14 left hand twist, specifications that seem to be exactly right. The groove in my newest Mark III is .3574, with rifling very smooth indeed. The grooves are .122 wide and very cleanly cut. I believe perfect rifling is more important for accuracy in a short tube than in a rifle, and the Mark III has it. In fact, it has every desirable quality for a fine match pistol right out of the box, at a very modest $125.

Colt deserves praise for holding quality to extremely high standards, and actually improving it, while some arms makers are letting quality control slip. I do not think there are any better revolvers made in the world than Colt's .22 and .38 Officers Model Match ,and the Colt .38 and .357 Trooper, or Colt's .357 Python. The Python is beautifully finished in Colt Royal Blue, which I believe is the most durable blue finish made. All of these revolvers show considerable hand fitting on vital parts. They cock easier than other makes, and triggers all break clean with a fine pull. Fitting is tops.

In New York City during 1963 there were 549 homicides. The knife (or other sharp weapon) was used in 225 or 41%, while physical force (hands or feet) was used in 101 homicides or 18%. A rifle or shotgun was used in 37 homicides or 7%. (NSSF)

The number of accidental deaths from firearms is dropping, while deaths from other causes are increasing. Five years ago, firearms deaths amounted to 1.5 per 100,000 people. Now the rate is 1.1 per 100,000. (NSSF)

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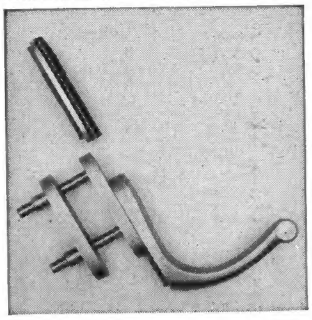
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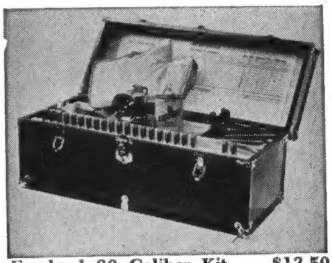

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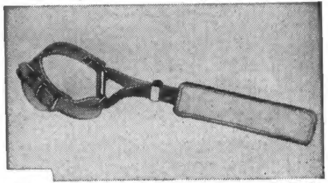
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GEORGE E. CLARKE, JR.

NBRSA Life Member George E. Clarke, Jr. of Washington, D. C. passed away on September 24th in Miami, Florida.

EASTERN REGION NBRSA MEMBERS

NOTE

The 1966 Winter Meeting of the Eastern Region NBRSA will be held on January 29 and 30, 1966 at the Sheraton Hotel and Motor Inn, 111 East Avenue, Rochester, New York. There will be no "Group Feeding"—eat when and where you wish. There are three restaurants in the hotel from which to choose. The hotel is a five minute walk from the center of the shopping district and right near the Eastman Theater.

Contact John Collins, 95 Devon Road, Rochester, N. Y. 14619 (Phone 716-Be 5-5098) for reservation and rate card, and brochure of Hotel. Reservation card should be mailed to reach John Collins before January 15, 1966.

WAYLAND M. BROWN

Wayland M. Brown, 61, of Augusta, Ohio, died suddenly of an apparent heart attack on September 24th.

W. M. Brown, "Brownie" to his many friends among the bench rest shooters, owned and built up the Reed's Run Rifle Range at Augusta where he conducted several popular bench rest tournaments each year for the past several years. He was formerly a very capable competitor in bench rest matches but, due to an arthritic condition, had to give up competitive shooting activity in recent years.

He is survived by his widow, Marie, and two daughters. His family have the deep sympathy of his host of friends among the shooters.

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NEW BENCH REST RECORDS

NBRSA Record Certificates have been issued to the following people for shooting new official record small groups and aggregates:

To Richard Hall, Warsaw, New York, for an aggregate of five 5-shot matches at 300 meters with **Heavy Varmint** rifle measuring .5260 minute-of-angle (MOA). (There is no previous record for this course of fire.) For shooting this record Mr. Hall used a .308 caliber in Hart barrel on Hart action, gunsmithed and stocked by Hall. The barrel was 22 inches long, .900 inch diameter with 1 in 14" twist and the gun weighed 13 lbs. 6 oz. His scope was a 20X Unertl. His load was 47 grs. H380, Sierra 168 gr. bullet and Rem. primers.

Two certificates were issued to **Parker Rollins**, Lincoln Park, Michigan, for: (a) A combined aggregate of five 5-shot matches at 200 yards and five 5-shot matches at 300 meters, with **Heavy Varmint** rifle, officially measured as averaging .4986 MOA. (b) A small 5-shot group at 300 meters range which was officially measured at 1.0597 inches. (There were no previous records for either of the above.)

For shooting these records Mr. Rollins used a 222 caliber with Hart barrel on Shilen action. Barrel was 26 inches long with 1 in 14" twist. His scope was a 20X Lyman. His load was 20.7 grs. 4198 powder, 53 gr. bullets and Rem. 6½ primers.

Certificates for four new records were issued to **Paul O. Gottschall**, Salem, Ohio, all for **Heavy Bench Rest Rifle, Restricted Rests class.** (a) A small 5-shot group at 300 meters range which was officially measured as .6050 inch. (This beat Bob Hart's .6377 inch group.) (b) For an aggregate of five 5-shot matches at 300 meters range which was officially measured as averaging .3770 MOA. (This beat Hart's record of .4802 MOA.) (c) For an aggregate of five 10-shot matches at 300 meters range which was officially measured as averaging .5352 MOA. (This beat Hart's record of .6840 MOA.) (d) For an aggregate of five 5-shot matches and 200 yards and five 5-shot matches at 300 meters which was officially measured as averaging .3639 MOA. (This beat Hart's record of .6114 MOA.)

For making these records Mr. Gottschall shot a .308 caliber in Hart barrel on FN action, gunsmithed and stocked by himself. The barrel was 28 inches long and 1⅜ inch diameter with 1 in 14" twist. His scope was a 24X Unertl. His load was 41 grs. of 3031 powder, Sierra 168 gr. International bullets and Rem. 8½ primers. The gun weighed 26 lbs.

Ferris Pindell, Richmond, Indiana, received a certificate for a **Heavy Bench Rest Rifle, unrestricted rests class** aggregate of five 10-shot matches at 200 yards and five 10-shot matches at 300 meters which was officially measured as averaging .5464 MOA. (This beat Hart's record of .6114 MOA.) For making this record Mr. Pindell shot a .308 caliber in Hart barrel on Weber action, gunsmithed and stocked by himself. The barrel was 30 inches long, 1⅜ inch in diameter, with 1 in 14 inch twist. The gun weighed 40 lbs. His scope was a 30X Unertl. His load was 47 grs. of H380 powder, his own bullets and CCI primers.

Three certificates were issued to **Clyde E. Yockey**, Apollo, Pa., all for **Heavy Bench Rest Rifle, unrestricted rests** class new records. (a) For an aggregate of five 10-shot matches at 300 meters range which was officially measured for an average of .5571 MOA. (This beats Frost's .5948 MOA.) (b) For an aggregate of five 5-shot matches at 200 yards and five 5-shot matches at 300 meters which was officially measured as an average of .4221 MOA. (This beat Rucker's .4302 MOA.) (c) For an aggregate of five 10-shot matches at 200 yards and five 10-shot matches at 300 meters which was officially measured for an average of .5528 MOA. (This beat Rucker's .6012 MOA.)

For making these three records Mr. Yockey shot a .308 W. caliber in a Hart barrel on a Rem. action which he gunsmithed and stocked himself. The barrel was 25½ inches long with a 1 in 14 inch twist and the gun weighed 35 lbs. His

All the competitors in the 1965 National Championships at Wapwallopen, Pa. grouped in the rear of the firing line. Shooters are grouped as they were assigned at the benches with the 1st relay in front, then 2nd, 3rd and 4th in the rear.

scope was a 24X Unertl. His load was 48 grs. of H380 powder, Sierra bullets and CCI Mag. primers.

All eleven of the foregoing records were made at a match conducted by the Chippewa Rifle Club at Easton, Ohio, May 8 and 9, 1965.

Mr. A. P. Broderick, Kirkwood, Missouri, has been issued a certificate for a new record 5-shot small group at 200 yards with a **Sporter class** rifle which was officially measured as .3072 inch. (This beats the .3720 inch record held by Crawford Hollidge since 1961.) For shooting this small group Mr. Broderick used a 6MM (243 B & F) in a Hart barrel on a Shilen action which was gunsmithed by Freund and stocked by Broderick. The barrel was 24 inches long, .730 inch diameter at muzzle with 1 in 12 inch twist. The gun weighed 10½ lbs. His scope was a 20X Litschert. His load was 30 grs. of 3031 powder, 70.5 gr. Freund bullets and Rem. primers.

A record certificate has been issued to **Thomas E. Gillman**, Hot Springs, Arkansas for an aggregate with **Sporter Class** rifle of five 5-shot matches at 100 yards and five

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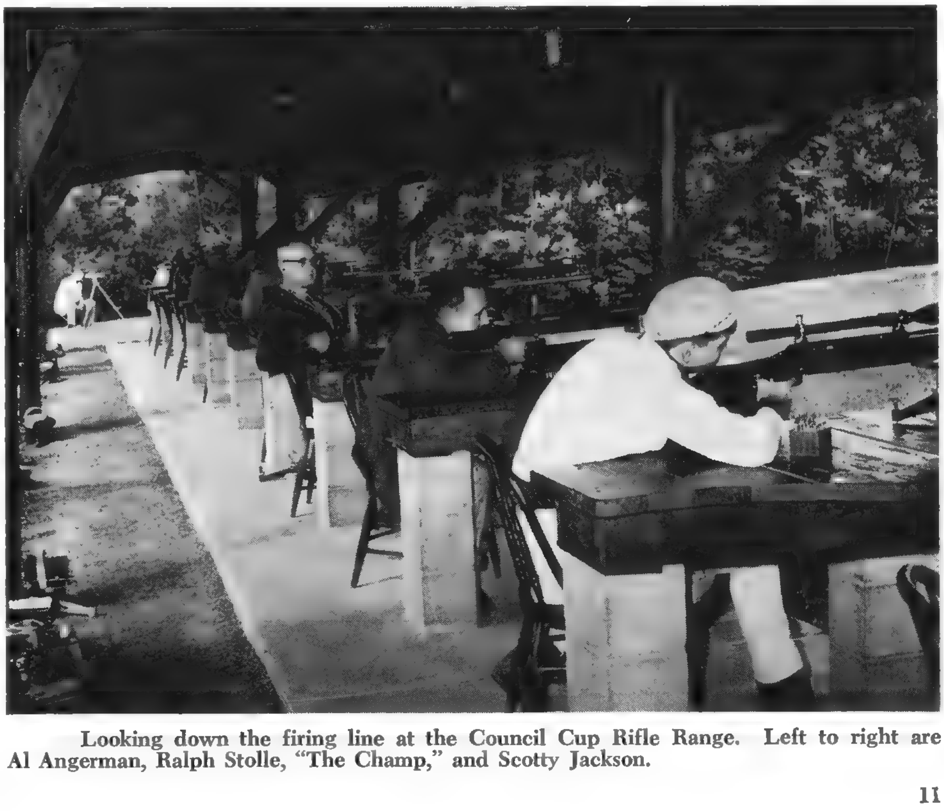

Looking down the firing line at the Council Cup Rifle Range. Left to right are Al Angerman, Ralph Stolle, "The Champ," and Scotty Jackson.

EQUIPMENT USED BY NATIONAL CHAMPIONSHIP "TOP TWENTY"

Competitor	Cal.	Action	Barrel	Lgth.	Diam.	Tl. Wt.	Scope	Load	Primer
Ralph W. Stolle Seabrook, Md.	.22X45 .308	Culver Culver	Hart Hart	27" 28"	1.250" 1⅜"	22 lb. 40 lb.	Unertl Unertl	22.5 gr. 4198 Culver 6S 52 gr. 44 gr. 4895 Culver 168 gr.	Rem. RWS
Cline Deere Washington C. H., Ohio	.308	722	Hart	28"	1⅜"	35 lb.	Lyman	42 gr. 4895 Sierra 168 gr.	Rem.
Frank B. Tirrell Stanfordville, N. Y.	.308	Tirrell	SS&D	29"	1.445"	76 lb.	Unertl	42.5 gr. 3031 B&A F.B. 162 gr.	Rem.
Eldon L. Stolle Seabrook, Md.	.22X45 .308	Culver Culver	Hart Hart	26" 27"	1.250" 1⅜"	24 lb. 30 lb.	Unertl Unertl	26 gr. 4198 Culver 7S 52 gr. 44 gr. 4895 Culver 168 gr.	RWS RWS
John S. Jackson Alexandria, Va.	.308	Hart	Hart	27"	1⅜"	—	Unertl	H380 Culver	CCI
Homer L. Culver Arlington, Va.	.30	Culver	Hart	28"	1.335"	30 lb.	Unertl	— —	CCI
L. S. Rucker Akron, Ohio	6MM .308	Weber Weber	Hart Hart	26" 26"	1.250" 1.250"	26 lb. 26 lb.	Unertl Unertl	36 gr. H380 Rucket 36BT 48 gr. H380 Rucket 167BT	CCI CCI
Bernice McMullen Minerva, Ohio	.30	Hart	Hart	29"	1.350"	27 lb.	Unertl	48 gr. H380 Culver 6½S 168 gr.	Rem.
Kenneth E. Gilbert Parkersburg, W. Va.	.308	Hart	Hart	29"	1.350"	26½ lb.	Unertl	47 gr. 4320 Sierra 168 gr.	CCI
Ferris Pindell Richmond, Ind.	.219 .308	Weber Weber	Hart Hart	30" 30"	1⅜" 1⅜"	40 lb. —	Unertl Unertl	25 gr. 3031 Own 39 gr. 3031 Sierra	Rem. Rem.
Bob Stultz Kansas City, Mo.	.222	FN	Hart	28"	1.350"	49 lb.	Unertl	24 gr. H335 Sierra 53 gr.	RWS
William S. Kappell Haddonfield, N. J.	.308	Hart	Hart	28"	1 8/16"	28 lb.	Unertl	42 gr. 3031 Culver 168 gr.	CCI
Omar Rinehart Salem, Ohio	.308	Culver	Hart	29"	1⅜"	30 lb.	Unertl	43 gr. 3031 Sierra	CCI
Clyde Yockey Apollo, Pa.	.308	Rem.	Hart	25"	—	36 lb.	Unertl	42.3 gr. 3031 Sierra	CCI
L. F. Carden Kansas City, Kans.	.222M .308	Baucher Baucher	Hart Hart	28" 28"	1¼" 1⅜"	35 lb. 37 lb.	Lyman Lyman	26.7 gr. Ball-C B&A 52 gr. 34 gr. H380 Sierra 168 gr.	RWS RWS
T. J. Jackson, Jr. Alexandria, Va.	.219	Rem.	Hart	28"	1⅜"	—	Unertl	— —	—
Paul Webb Goshen, Mass.	.308	Shilen	SS&D	28"	1½"	26 lb.	Unertl	42 gr. 3031 B&A 165 gr.	Rem.
Maj. Rick Hornbeck Wichita, Kans.	22X45	S&L	Hart	28"	1.250"	30 lb.	B&L 6-24	26 gr. Ball-C Own 53 gr.	RWS
W. J. Purcell Howes Cave, N. Y.	.308	Hart	Hart	27"	1.200"	27 lb.	Unertl	47.2 gr. H380 Sierra 168 gr.	Rem.
Olin M. Davis Alexandria, Va.	.308	Culver	Hart	28"	1.375"	24 lb.	Unertl	49 gr. H380 Culver 166 gr.	CCI

THE 1965 BENCH REST RIFLE NATIONAL CHAMPIONSHIPS

Fired on the Council Cup Rifle Range, Wapwallopen, Pennsylvania, August 28, 29, 30 and 31, 1965. Seventy-seven competitors.

CHAMPIONS AND AWARDS

National Champion, Ralph Stolle	WHELEN TROPHY FIELD & STREAM TROPHY BAUSCH & LOMB PLAQUE
1st Runner-up, Cline Deere	10" Revere Bowl
2nd Runner-up, Frank Tirrell	8" Revere Bowl
100 Yard Champion, Eldon Stolle	SPEER TROPHY
200 Yard Champion, Cline Deere	SIERRA TROPHY

THE "TOP TWENTY"

		N/C Aggregates—moa 100 Yd.	200 Yd.	GRAND	Class
1.	Ralph Stolle	.5496	.5006	.5251	L
2.	Cline Deere	.5888	.4777	.5332	O
3.	Frank Tirrell	.5910	.4866	.5388	O
4.	Eldon Stolle	.4722	.6336	.5529	L
5.	John Jackson	.5867	.5356	.5611	L
6.	Homer Culver	.5463	.5980	.5721	L
7.	L. S. Rucker	.6098	.5686	.5892	O
8.	Bernice McMullen	.5929	.5907	.5916	L
9.	Kenneth Gilbert	.6056	.5800	.5928	L
10.	Ferris Pindell	.5283	.6597	.5940	L
11.	Bob Stultz	.5185	.6808	.5996	O
12.	William Kappel	.6085	.5926	.6005	L
13.	Omar Rinehart	.5683	.6522	.6102	L
14.	Clyde Yockey	.5902	.6407	.6154	O
15.	L. F. Carden	.5864	.6457	.6160	O
16.	T. J. Jackson, Jr.	.5711	.6887	.6299	O
17.	Paul Webb	.5852	.6921	.6386	L
18.	Rick Hornbeck	.6228	.6631	.6429	O
19.	W. J. Purcell	.6384	.6632	.6508	L
20.	Olin M. Davis	.6543	.6684	.6613	L

(NOTE: "L" indicates restricted rests class. "O" indicates unrestricted rests class. The national champions, the 100 yard champion, the 200 yard champion and winners of the "TOP TWENTY" patches are ranked regardless of class. All fired matches and daily aggregates are ranked separately for each class.)

MATCH AND DAILY AGGREGATE WINNERS

UNRESTRICTED CLASS		RESTRICTED CLASS	
Saturday, August 28th — 100 yards			
Warm-up; Walt Berger	.243"	Herbert Stark	.243"
#1 L. F. Carden	.377"	Ted Boughton	.460"
#2 Walt Berger	.302"	Eldon Stolle	.327"
#2 T. J. Jackson, Jr.	.370"	Alvin Rosenfield	.420"
#4 Wm. Schellert	.302"	William Kappel	.430"
#5 L. S. Rucker	.383"	Edith Culver	.252"
Agg. Bob Stultz	.5006"	Eldon Stolle	.5100"
Sunday, August 29th — 100 yards			
Warm-up Frank Muriel	.345"	Edith Culver	.346"
#6 M. J. Toutant	.444"	Eldon Stolle	.377"
#7 T. J. Jackson, Jr.	.430"	Ralph Stolle	.373"
#8 Clifton Carr	.330"	John Kohler	.362"
#9 Wm. Schellert	.310"	Paul Webb	.365"
#10 L. F. Carden	.325"	Ralph Stolle	.280"
Agg. L. F. Carden	.5290"	Eldon Stolle	.4344"
Monday, August 30th — 200 yards			
Warm-Up Frank Tirrell	.780"	Omar Rinehart	.820"
#1 L. F. Carden	.965"	John Jackson	.666"
#2 Frank Tirrell	.885"	Sam Nadler	.838"
#3 Cline Deere	.815"	Kenneth Gilbert	.616"
#4 L. F. Carden	.452"	Ralph Stolle	.635"
#5 Barbara Schellert	.546"	Frank Jeziero	.655"
Agg. Frank Tirrell	.5029 moa	A. H. Garcelon	.5216 moa
Tuesday, August 31st — 200 yards			
Warm-Up Walt Berger	.870"	L. A. White	.755"
#6 Cline Deere	.595"	Kenneth Gilbert	.650"
#7 L. E. Wilson	.708"	Ralph Stolle	.827"
#8 L. F. Carden	.840"	Ralph Stolle	.572"
#9 L. S. Rucker	.738"	Geo. McMullen	.582"
#10 L. E. Wilson	.741"	A. H. Garcelon	.684"
Agg. Cline Deere	.4331 moa	Ralph Stolle	.4752 moa

(Editor's comment: It is reported that weather conditions for shooting were not favorable at the 1965 National Championships. While it took real small groups to win any fired match, the unfavorable shooting weathre is reflected in the aggregates which were generally larger than in the prior two National shoots held in the Eastern Region. In 1961 the top 11 shooters had championship aggregates under half-minute-of-angle—that shoot was at Johnstown, New York. In 1963, at Wapwallopen, the top 5 shooters had championship aggregates under half-minute-of-angle.

Also of interest is the fact that Cline Deere and Ralph Stolle have been nip-and-tuck at the last three Nationals held in the Eastern Region. In 1961, at Johnstown, Cline Deere won the championship and Ralph Stolle was runner-up. In 1963, at Wapwallopen, Ralph Stolle ranked 5th and Cline Deere 6th. Also, Eldon Stolle, Ralph's son, ranked 3rd over-all in 1961, 4th in 1963 and 4th again this year. Neither Cline Deere nor the Stolles have fared quite so well at the 1962 or 1964 shoots at Tulsa, Okla. but they haven't been far down the ranking lists under those less familiar conditions.

This year's third ranking Frank Tirrell is a relatively new shooter in bench rest competition. I believe he fired in his first NBRSA competition in 1964.

Bob Hart makes every effort to not only run a good shoot but also to provide for the comfort and entertainment of shooting guests at his Council Cup Rifle Range. Friday night before the shoot featured the customary corn roast. Saturday night a fine string trio provided music for square dancing in the spacious dining room of the club house. Sunday night Mike Walker showed slides of his recent African safari with Warren Page. Monday night Gene Beecher sohwed excellent slides he has taken on tours of the eastern part of the country. The prize awarding ceremonies were held Tuesday night.

OVERALL EQUIPMENT SURVEY

CALIBERS: The most outstanding change in equipment used at this year's heavy bench rifle National shoot is the greatly increased use of .30 caliber rifles. Of the 86 guns listed, 39 were of .30 caliber. Nearly all of the .30's appear to be the .308 Win. or NATO cartridge case, with a very few apparently being "Wild-catted" or "Improved." Ten used the .30 cal. at only the 200 yard range but the other twenty-nine fired the full course with the .30's. Two used 6MM rifles, one for the 100 yard matches and the other apparently for the 200 yard stages. Of the .22 calibers, 33 were of the .222 Rem. family of cartridges, including the regular, magnum, 222½, 22X45 and one .223. There were only 11 of the .219 Dons used this year and one other .22 cal. (no details listed).

ACTIONS: Listed were 23 actions of Remington parentage, including 722's (some sleeved) and 40X. There were 8 Mauser, 7 Weber and 7 Schults & Larse, and 2 Win. M70 (one noted as being sleeved). Of the custom made actions there were 19 Hart, 8 Culver, 5 Baucher (a Kansas City gunsmith), 2 Schneck and one each Tirrell, Shilen, Little and two were listed as "own."

BARRELS: Hart barrels were on 71 of the rifles, 7 had Douglas, 2 Johnson, and 1 each Day, Remington, Shilen and Walker.

SCOPES: Listed were 68 Unertl scopes, 9 Lyman and 9 Bausch & Lomb 6-24. It appears probable that some of those shooting two guns may have used the same scope on both guns but that was not true of all the two-gun shooters. The most popular scope was the Unertl 24x. One used a 15X scope and one a 14X. Other scopes ranged from 20X through 32X for power.

BULLETS: In .30 cal., 22 shot the 168 gr. Sierra match bullets and 1 shot the Hornady 168 gr. match bullet. Custom made Culver bullets were used by 8 and 1 listed "Shilen." Bullets made in B&A dies were listed for 5, and 1 was listed simply as "own." Only one shooter listed a .30 cal. bullet lighter than 160 Grs. and that was 148 grs. In .22 cal., 6 used bullets made by Culver, 3 by Detsch and 1 each by Brown, Shilen and Stolle. Of the 20 using their own homemade bullets 9 were identified as being made in B&A dies. The Sierra 53 gr. match

Turn page

bullets were used by 11. The two 6MM shooters used their own home-made bullets.

POWDER: Nineteen of the .30 cal. shooters used H380 powder, ten used 3031, 6 used 4895, two used 4320, and two used the new Hercules RelodeR No. 11 powder. Twenty-one of the .22 cal. shooters used Ball-C powder, ten used 4198, three 3031, five RelodeR No. 11, and one each used 4320, 4895, H335 and H380. One of the 6MM shooters used H380 and the other RelodeR No. 11.

PRIMERS: Nineteen of the .30 cal. shooters used Remington primers, fifteen used CCI, three RWS and one each W-W and Federal.

Twenty-six of the .22 cal. shooters used Remington primers, eight used CCI, six RWS, two W-W, and one used the long discontinued Winchester 115 primer. Both 6MM shooters used CCI primers.

• • •

New Bench Rest Records

From page 11

5-shot matches at 200 yards which was officially measured for an average of .4131 MOA. This beat Dave Hall's .4787 MOA. (Gillman also fired a .3414 MOA agg. at 100 yards which was smaller than Dave Hall's .3695 MOA but M. M. Oakley, shooting in the same relay, shot an even smaller agg. to claim the new record.) Mr. Gillman shot a 6MM belted "Tom Cat" (Weatherby 22 belted magnum necked up) in a Hart barrel on a Gillman action, the gun weighing 10½ lbs. The barrel was 21 inches long, .841 inch diameter at the muzzle with 1 in 14 inch twist. Gillman did his own gunsmithing and stocking. His scope was a 20X Litschert. His load was 26.5 grs. of H895 powder, 75 gr. Sierra bullets and Remington primers.

A certificate for a new **Sporter Rifle** class record has been issued to **Mr. M. M. Oakley,** Seattle, Washington, for an aggregate of five 5-shot matches at 100 yards which was officially judged as an average of .3187 MOA. For shooting this record aggregate Mr. Oakley used a 6MM Wasp caliber in Hart barrel on Remington action, which was gunsmithed by Welker and stocked by Frombach. The barrel was 24 inches long, .750 inch diameter at muzzle, with 1 in 14 inch twist, the gun weighing 10 lbs. 7 oz. His scope was a 10X Lyman. His load was 31.7 grs. of H380 Powder, 71.5 gr. Bahler bullets and CCI primers.

The records made by Broderick, Gillman and Oakley were all fired in the matches conducted by the Mill Creek Rifle Club, Kansas City, Kansas on July 3 and 4, 1965.

Mr. Larry Beard, Tulsa, Oklahoma has been issued certificates for the following records shot in **Light Varmint Rifle** class in a registered match conducted by the Tulsa Bench Rest Rifle Club on the John Zink Range near Tulsa on July 17th, 1965. (a) For a small 5-shot group at 100 yards which was officially measured as .0950 inch. (This is substantially smaller than the .1629 inch record which has been held by Richardson.) Mr. Beard's five 100 yard targets were officially measured as .3231 MOA (not a record). (b) Beard's five targets at 200 yards were officially measured as a .4411 MOA average, which just noses out Dave Hall's record of .4430 MOA. (c) Beard's grand aggregate (for five 5-shot matches at each 100 and 200 yards) is therefore .3821 MOA. This is so close to Harold Campau's .3832 MOA record that the NBRSA Judging Committee ruled that Mr. Beard and Mr. Campau become **co-holders** of the **Light Varmint** class grand aggregate.

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Front of the Council Cup Range firing line. Bending over at the bench is Marion Reece and at the next bench is 1964 defending champion Homer Culver.

For this shooting Mr. Beard used a 222 Rem. caliber in a Hart barrel on a Hart action. The barrel was 18.5 inches long, .895 inch diameter at the muzzle, with 1 in 14 inch twist, the gun weighing 10 lbs. 8 oz. The rifle was gunsmithed by Cornelison and stocked by Beard. His scope was a 20X Bushnell. His load was 23 grs. of Ball-C powder and 53 gr. Sierra bullets.

CORRECTIONS

WRONG DATE: The records listed for Rucker and for Frost on page 8 of the September issue were fired on **May 9 and 10, 1964** instead of on the 1965 dates published.

WRONG CLASS: A record made by Allen Bench in Heavy Bench Rest Rifle class which was initially believed to have been shot with unrestricted rests has been found to have been fired with restricted rests and that it edges out Ferris Pindell's former record.

Bench Rest Match Reports

TULSA, OKLAHOMA

The Tulsa Bench Rest Rifle Club held its last match of the year on September 19 at the John Zink Range, with competitors firing in Heavy Varmint and Unrestricted Bench classes. Conditions varied from periods of bright sunlight to heavy rainstorms, with corresponding tricky wind and mirage changes.

HEAVY VARMINT

Jim Hale from Jenks, Oklahoma took control from the very start, winning the 100 yard aggregate and shooting small group of .154. He went on to place third at 200 yards and first in the grand aggregate.

Tom Gillman led the field at 200 yards and also fired small group of .307.

The Results:

Competitor	100 yd. Agg.	200 yd. Agg.	Grand Agg.
Jim Hale	.3224 (1)	.4808 (3)	.4016
Stephen Savner	.3872 (2)	.4630 (2)	.4251
Tom Gillman	.4140 (4)	.4518 (1)	.4329

Hale fired a .22-40 (.222 Mag. with 40° shoulder) in a three groove stainless steel Day barrel on 722 Rem. action; Savner a .222 in Hart barrel on a Sako action with Baucher sleeve; Gillman his .22 Tomcat in Hart barrel on his own action.

UNRESTRICTED BENCH

L. E. "Red" Cornelison of Seminole, Oklahoma placed first at 100 yards while firing small group of .186.

At 200 yards the conditions began to take their toll and two .308 shooters, Art

At the "Wailing Wall"; (left to right) "Hap" Zeiser, George McMullen, Paul Gottschall, Bernice McMullen, ?, Wm. Schellert.

Day and Ed Garrott, placed first and second respectively. Larry Englebrecht fired small group of .897 using a .222.

Consistency paid off for Walt Berger, Overland Park, Kansas, as he placed second at 100 yards, third at 200 yards, and first in the grand aggregate.

The results:

Competitor	100 yd. Agg.	200 yd. Agg.	Grand Agg.
Walt Berger	.4498 (2)	.7414 (3)	.5956
L. E. Cornelison	.4082 (1)	.8044 (4)	.6063
A. L. Day	.5360 (4)	.7010 (1)	.6185
Ed Garrott		.7046 (2)	

Berger fired a .222 in Hart barrel on Baucher sleeved action; Cornelison his .22-40 in Hart barrel on sleeved Remington action. A. L. Day, after firing a .220 Short Swift at 100 yards, changed to a .308 at 200. Both were his own three groove barrels and were used on a Weber bench action.

The Tulsa club has had a good turnout for all its matches of the past shooting season. We would especially like to thank all the out of state shooters who attended, and hope they enjoyed themselves and will return to shoot with us next year.

Larry Beard

CANTON, OHIO

At the Canton-McKinley Rifle Club's registered heavy varmint class shoot on September 25, 25 shot the 100 yard stage and 28 the 200 yard stage.

The high-five for the 100 yard aggregate were: Omar Rinehart .3460, Clem Mervis .3512, Ernest Scafuri .4116, R. Casper .4294 and Al Creighton .4606.

For the 200 yard aggregate it was: Scafuri .3348, Larry Mangon .4202, Dave Hall .4248, Rinehart .4305 and Richard Hall .4496.

Grand aggregate high-five were: Scafuri .3732, Rinehart .3882, Mervis .4084, Mangon .4498 and Creighton.

Listed for score at 200 yards with possible 250's were: Rinehart 20x, Anderson 19x, Young 17x, Dave Hall 16x and R. Casper 15x. Kimes dropped a point but had 19x's.

September 10th and 11th

Seventeen shot five 5-shot matches for score at 200 yards with heavy varmint rifles. Making 250 possible scores were: Rinehart 22x, Anderson 21x, Gottschall 20x, Kimes 19x and Young 18x. Casper dropped a point but had 20 x's, as did Mangon who had 19 x's.

WICHITA, KANSAS

At the Wichita Bench Rest Rifle Club's range on October 2nd, 13 shot in Heavy Varmint class and 5 in Bench Rest Rifle unrestricted rests class. Weather conditions are reported to have been unusually good; calm for the 100 yard matches and slight wind and mirage for the 200 yard matches. The high ranking aggregates were:

Heavy Varmint Rifle at 100 yards; Larry Engelbrecht .3062, Bernie Geenens .3300, R. A. Shanafelt .3606, Larry Kuse .3626, and Bob Stultz .3636. At 200 yards; Engelbrecht .3400, Geenens .3557, Stultz .3738, Burt Camp .4513, and John Zogar .4625. For grand aggregate it was; Engelbrecht .3231, Geenens .3428, Stultz .3687, Zogar .4158, and Kuse .4287. Larry Engelbrecht shot small group at both ranges; .192 inch at 100 yards and .373 inch at 200 yards.

In Bench Rifle (Un) class, all five competitors shot NMC aggregates under half-minute-of-angle; L. F. Carden .3213, Walt Berger .3322, Jack Thompson .4002, Bill Starks .4126, and Bob Junk .4460. Walt Berger shot small group at both ranges; .261 inch at 100 yards and .396 inch at 200 yards.

All shooters in both classes shot .22 cal. rifles. In Varmint class, Engelbrecht, Geenens, Stultz and Zogar used Hart barrels with, in order named, 722, Baucher, 40X and FN actions; Larry Kuse used a Douglas barrel and Sako action. In Bench Rifle class, Carden and Berger used Baucher actions with Hart barrels; Starks and Junk used Rem. actions with Hart barrels, while Thompson used a Douglas barrel on his own action.

ST. LOUIS, MISSOURI

The Mississippi Valley Regional Championship tournaments were shot at the St. Louis Benchrest Rifle Club on October 2nd and 3rd. We had an excellent time at the bench even though conditions were very tricky. A fishtailing wind with its constantly changing mirage made for the high

Turn page

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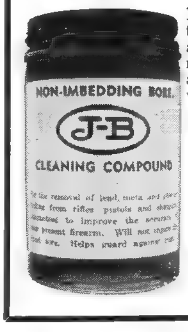

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"Award winners at St. Louis, Mo. Bench Rest Match. Left to right; Don Hill, Larry Beard, Tom Gillman and Wm. Schellert."

Bench Rest Match Reports

aggregates. When the first three places in each individual match were announced, it seemed almost impossible that someone had not shot a smaller group than those announced.

The top ranking grand aggregates in each class were:

Light Varmint class; Tom Gillman .4492, Larry Beard .4970, and Frank Muriel .5521.

Bench Rest Rifle (Un) class; Ferris Pindell .4271, William Schellert .4802, and Frank Muriel .5244.

Heavy Varmint Rifle class; Larry Beard .3977, Don Hill .4649, and Tom Gillman .5181.

Sporter Rifle class; Tom Gillman .6128, Don Hill .6433, and A. J. Freund .7190.

All listed award winners in all classes shot Hart barrels, on a variety of actions, several of which were home or custom made. In all except Sporter class, all listed awards winners shot .22 cal. rifles. In Sporter class, Gillman and Hill shot Gillman's 6MM Belted Tom Cat, and Freund shot a 6MM International.

SEASON AGGREGATE: Starting with the 1965 season, we are awarding a large plaque for the best two out of three aggregates in each class. These plaques will be awarded for ten years with each season's champion having his name engraved on a separate plate. Any shooter winning a plaque three times during the ten years retains permanent possession. The 1965 champions were: Heavy Varmint class, Don Hill .4144; Light Varmint class, Tom Gillman .4889; Sporter class, A. M. Freund .6178; Bench Rest Rifle (Un), Wm. Schellert .4990 MOA.

COMMENT: The competition is very tough here on the Colonel Whelen Range. National Champion Tom Gillman attended all our shoots this year and we all feel we are shooting against the best when Tom is in a tournament. It is interesting to note that all four of our Heavy Varmint class tournaments had a different winner. This helps to disprove the idea that the matches are always won by the same shooter. Shooters who have not tried their skill on our range would do well to consider attending one of our shoots. If everything goes well he can certainly feel he has beaten the best. If he doesn't win, what better comparison of his skill could he have than a match report from the St. Louis Benchrest Rifle Club. Thanks to all the many visitors who traveled so far this year to make this our best match season. We hope to see all our old friends and make many new ones next year.

Don Hill

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HORNADY .224 CAL. MATCH BULLETS

J. W. Hornady supplied a sample lot of the .224 HORNADY 53 gr. match bullets for testing. Since I do not have a .22 cal. rifle that is accurate enough to fairly test good bullets I enlisted the aid of two friends to do the testing for me. Both of these friends are regular competitors in NBRSA matches and both have accurate rifles of Heavy Varmint class. They made a comparative test of the Hornady bullets and four other bullets (two handmade bullets and two factory produced bullets) at one shooting session. Wind was from calm to 15 mph from 10 to 12 o'clock, there was some mirage, there were some light changes but generally sunny.

Shooter No. 1 uses a 222 Rem. caliber and used a charge of 24½ grs. of Ball-C2 with all the bullets. Shooter No. 2 uses a shortened 22/250 Varminter case and shot a charge of 29 grs. of 3031 powder with all bullets. All shooting was 5-shot groups at 100 yards.

Shooter #1 made groups of .650, .620 and .425 with handmade bullet "A". With handmade bullet "B" he made groups of .530, .237 and .414. With competitive commercial bullet "C" he made groups of .825 and .465. With competitive bullet "D" his groups were .890 and .600. His groups with the Hornady bullets were .459, .570, .580, .545 and .650 for average of .553. His overall average for 15 groups with the 5 bullets was .564.

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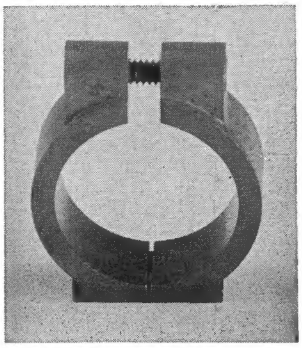

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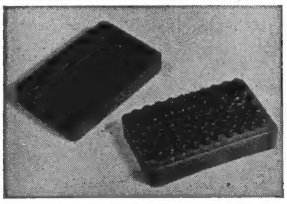

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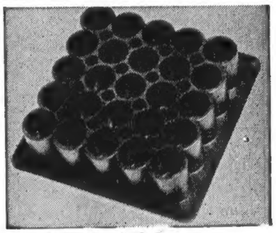

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Shooter #2 shot groups with "A" bullet of .630 and .690. With "B" bullets his groups were .604 and .340. With "C" bullets his groups were .987 and 1.150. With "D" bullets the groups were .830 and .527. His groups with the Hornady bullets were .484, .867, .745,. 855 and .668 for an average of .724. His overall average for 13 groups with the 5 bullets was .721.

For shooter #1 the Hornady bullets did better than either competitive factory bullet, approximately as good as handmade bullet "A", but not nearly so good as handmade bullet "B". For shooter #2, the Hornady bullets did better than competitive bullet "C" but not quite so good as the other 3 bullets tested.

The test does point up the fact that some rifles may be more "choosey" about bullets than some others. That is something the shooter has to find out for himself by trial-and-error methods.

From this test it appears that the new Hornady bullets are capable of excellent accuracy. Shooters who use factory produced .22 cal. bullets for their match shooting might be well advised to obtain some of the Hornady bullets for testing in their own rifles, if they have not alreday done so.

PHT

• • •

THE SHOP

By Roy F. Dunlap

Been a long time. Nothing much worth talking about, for past year, about 'shop' I mean. I been having troubles with barrels. Barrelmakers been having trouble with barrels. Think everybody is coming clear now. Also other things. If you're going to build something on a single-shot Mauser action, have Douglas or some other quaiflied — and equipped — outfit check it for hardness and if it ain't, re-heat-treat it. Before you haev barrelled and bedded, because if it needs treatment, it won't be quite the same size as before! With present epoxy beddings there isn't any room for changes later.

I've been working some with Bisonite 88-B compound, believe it best outfit on the market for either home or professional shop. Does beautiful job, not hard to use if you have any sense, and no shrinkage that can be measured. Bob McDonald, head of the Ft. Benning AMU shop, says they've made temperature tests, and can't find any heat expansion or contraction. Plug all openings in receivers and stocks with modelling clay to keep it out of unwanted places when bedding a rifle, file any tool-marks off recoil lugs, etc. This stuff doesn't allow any carelessness in preparation of metal or wood.

I note mention of the Russian 'Strela' .22 match rifle in September issue . . . have one of the current models, considerably different—front sight is now adjustable for windage as well as elevation, so you can use sights offset if you want to. Also, they're trying the barrel bedding block idea—steel block around barrel tied into forend with four or five large screws. Action and rest of barrel completely floating. Same factory make the CM-2 .22 rifle, a conventional target type which is probably the basic type for their version of the UIT 'Standard' class, but the Russians didn't make it up to the 11 pound weight limit—so it comes out about 9¼, has a short butt—

Turn page

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FORSTER APPELT, Lanark, Ill.

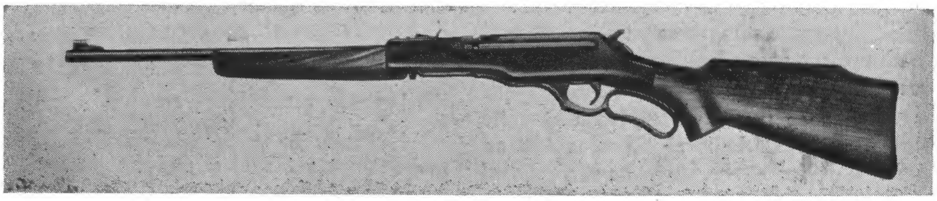
and is the cloest thing to a real target rifle for juniors that I've seen yet. Fine rear sight. The 65% duty on iron-curtain country rifles makes price rough, though. New wrinkle—on both bottom of the CM-2 and the Strela bedding block, Russians put sharp checkering, or you might call it rough rather than sharp. When no bedding compound is used, this idea would seem to make a .22 stay put in its inletting. The CM-2 stock seems to be a good grade of pine or such, so maybe they figured something was needed to keep metal and wood sort of together for awhile!

Bo Clerke of California won the national bolt rifle championship with a .308, in case anybody is interested. Think the only points he lost were in standing. Marines won all 1000 yard matches with .300 Winchester magnums, in—ahem—Dunlap stocks. Sgt. Willis of Army set new 1000 yard record—42 V's in match in July, with .30/338 in one of my stocks. This is all I have to be happy about for the summer.

The furriners learned how to make .22 match ammunition . . . The German RWS R-50 came up a couple years ago and has been taking world and Olympic shoots . . . now the British have good stuff—believe Larry Wilkens won the any-sight aggregate at Camp Perry with it. The Canadian C-I-L match is holding its own very well, and comes in a nice plastic loading block, too. The Russians have a good match .22 now. Has an indent in center of head which they think may aid ignition by directing primer flash forward into case. The Finnish Lapua .22 stuff now widely sold in US, at a decent price, is called match-grade, though it isn't specifically made as a premium match cartridge. Most or all in U. S. I think is the thick-rim type, and works well in .22's with maximum headspace. Have been told it is available in Europe in two rim thicknesses, so it will perform in rifles having either minimum or maximum headspace. Most U. S. match ammo requires minimum headspace for good accuracy.

Life gets more complicated all the time, with differences in bullets, headspace, diameter of bullets and barrels, etc. etc. Put a barrel on a .308 and headspace properly with nice, new, legitimate gages—and you can't get an LC Nat'l Match case into the chamber. It's bigger all over . . . 30 caliber match bullets run from .3080 to .3090. Barrels run from .3080 to .3086 in groove diameters, .3000 to .3015 in bores . . . . So don't bother listening to the next argument you hear between match shooters about how one load is so good and how it ain't worth nothing. They can all be right! Today a competitive big bore shooter better also be a bench-rest shooter—he's going to have to test loads quite a bit, and be ready to quit using his favorite bullet until he shoots out his present barrel. The next one may like the old bullet fine. Some of the 1964 LC 7.62mm Nat'l Match ammunition was loaded with a ball powder that enjoys barrels—it eats hollows in throats. Since us civilians don't have it, we don't have to worry much about this defugalty.

Been a lot of good dope published in past year. Fred Hallberg's experiments with rifle twist, velocity and accuracy interesting, but there is another factor—acceleration, related to both case capacity, and shape, and powder characteristics. About ten years ago I was playing with a Potter chronograph and for no good reason worked up loads with various powders, to get same velocity in same rifle with same lot of bullets. These loads performed in range tests with no similarity as to accuracy, even when very similar powders were used, driving the same bullets at same instrumental velocities out of same rifle. I could only assume that the initial acceleration of the bullet in the barrel varied enough to affect stabilization after it left the barrel. Things like this ruined my respect for formulas and equations long ago.



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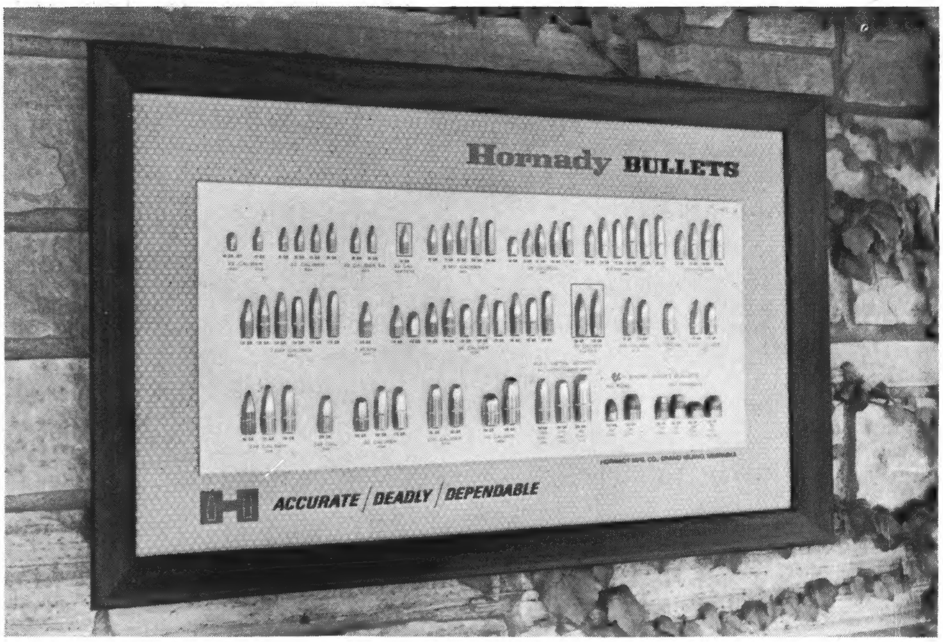
The Hornady Manufacturing Company now has available a new bullet display board with all 74 of the Hornady bullets mounted in easily identified groups on the panel and tarnish proofed. The panel is in a 14" x 22" walnut finished wood frame.

While the new board is primarily intended for dealer display, it is available to any individual who may wish one for their den or gun room. The retail cost of the board is $9.50 and they are available through Hornady jobbers or directly from the factory (P. O. Box 906, Grand Island, Nebraska).



The new HORNADY bullets display board.

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RIGHT OR WRONG ON WRIGHT

(Comment on Paul Wright's Comment on Twist, Etc.)

By Edward M. Yard

Paul Wright raises several questions in his P. S. article of October, 1965. He distinctly says he doesn't want a lengthy and technically involved discussion. Should he read this, he may, seeing my name and perhaps remembering some calculus I've implanted here, decide to thumb on. Really I know nothing about this whole area of ballistics. It follows I can't be at all technical.

I do have ideas. This may qualify me for some other of Wright's categories. They will be kept strictly non-mathematical. This is not just to suit Paul Wright, but me as well. While I may at times pop a differential or an integral, life is much simpler without them, if we can manage it. There is hope, therefore, that I can comment on this without sailing clear over my own head.

First item of discussion is a bullet. It is an object traversing space. It has initial forces and conditions. It then conforms to these and outside forces. And every force acting on it has its own and cumulative effect.

Most arrows have a heavy point. Gravity acting on this end of an arrow leads it back to earth. The feather end has more lift, so stays aloft, and follows the point. Where a bullet will go depends upon first and final forces.

At any long range, conical objects will drop point first because this is the path of least resistance. Because lift is in proportion to area, the base of a bullet has more righting force than the nose.

Within the field of gravity and so long as air resistance is appreciable to create a lift effect, the point of a bullet will tend ot drop. What happens in individual cases will be a result of all of the conditions.

For a bullet to follow a corkscrew path of definite dimensions requires a specific imbalance of the bullet and the forces acting on it. The period of bullet eccentricity with that of axial travel must be related to define the spiral path. The forces about the axis of rotation must be balanced at all times to produce the fixed spiral.

Any bullet dynamically balanced about its own long axis will follow a straight path without spiral about its own axis. Any other forces acting on it will have their own special effect. Over short distances these are negligible. Over distances of bullet flight in air, the resistance of the atmosphere is the main retarding force, and the pull of gravity the major force affecting path.

If you shoot your bullet in a vacuum such as space with the gravity effect of earth predominant, then the bullet axis will stay parallel to the bore. The only force here is the spin inertia and the gravity pull on the c. g. If you shoot in air, then the lift of the bullet is another powerful force affecting it, and is one which will alter its path. A bullet under these forces will tend to follow its nose. Usually the gyro effect will be altered enough that bullets will be coming nearly point down along their curve.

This is undoubtedly much less technical than Mr. Wright had in mind, and thus may fail him in the other direction. Armor piercing naval shells had better fall point first. If not, their effectiveness is much decreased. They are shot through air. The restoring forces are enough to keep their path reasonably tangent to gravity gradients.

Since I clearly can't qualify as an authority in this field, and am thus not a **real** authority, these comments are an expression of opinion about his questions. If they help in leading to the desired definitive answer, then we'll be happy.

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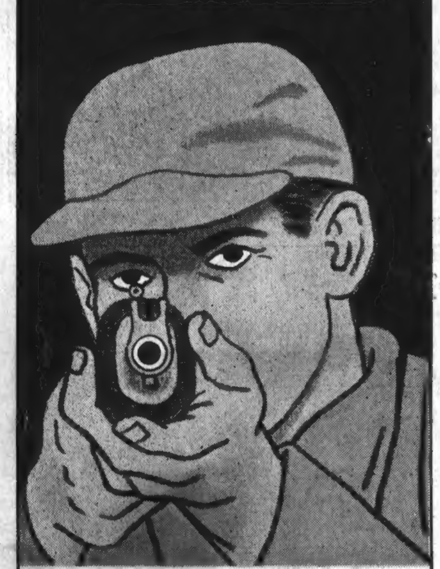

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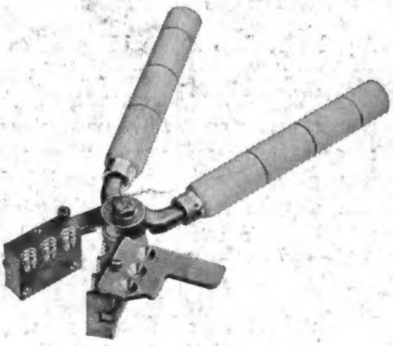

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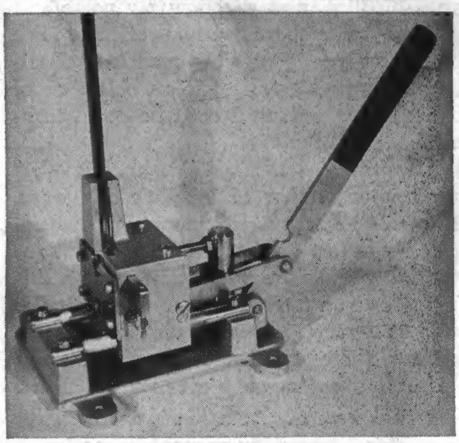

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